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ABSTRACT

The ways that the assessment practices of student teachers are formed by their experiences in methods courses and practicum classrooms were studied. By contrasting the approaches of two groups of student teachers to pupil assessment, the case study research described shows how student teachers emphasize the dimensions of assessment that demonstrate both their control of procedure and content and their control of student behavior and learning in the classroom. Subjects were four students from a methods course that emphasized the importance of teaching students to develop their own mathematical problem-solving strategies, and four students from a methods course that emphasized the importance of teaching students to understand and follow sequences of algorithms for mathematical problems. These control-related aspects of the practicum experience derive primarily from pressure exerted by cooperating teachers to maintain the established classroom order, and secondarily from approaches that have been propounded in methods courses. (Author/SLD)

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ED 405 372

Student teachers learn to assess pupils in the practicum classroom: Clarifying distinctive dimensions of assessment.

Abstract

This essay explores ways that the assessment practices of student teachers are formed by their experiences in methods courses and practicum classrooms. By contrasting the approaches of two groups of student teachers to pupil assessment, the case study research described in this report shows how student teachers emphasize the dimensions of assessment that demonstrate, both, their control of procedure and content, and their control of student behavior and learning in the classroom. These control-related aspects of the practicum experience derive primarily from pressure exerted by cooperating teachers to maintain the established classroom order, and derive secondarily from approaches that have been propounded in methods courses.

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Classroom Assessment

In the classroom, assessment is the process by which teachers gather information about the capabilities, understanding, and learning of their pupils. Assessment occupies a prominent place in writing on education because we assume that there is a close correspondence between the importance of an object of assessment and the intensity of efforts that are made to assess it. This assumption is useful in part because it impels us to examine the degree to which certain aspects of education are stressed in assessment. Thus, if tests of pupil performance are assessed with more intensity than the content of curricula and the strategies that are used to teach mathematics, then it would be useful for scholars and practitioners alike to know that this is the case. In addition, the assumption is useful since it so clearly invites a challenge. Thus, the mere fact that some aspect of education is assessed intensely does not necessarily mean that it is more important in objective terms than other aspects that are assessed less intensely. Indeed, it is possible that some of the most "important" issues in education are the ones that both scholars and practitioners neglect to examine thoroughly at all. For example, if tests of pupil performance comprise a very large proportion of the assessment activities in a given educational environment, then it is possible that there are important aspects of curricular content and instructional approaches that fail to receive sufficient critical attention.

Research Questions and Methods

With the foregoing considerations in mind, I have undertaken a systematic study of the ways that teachers learn to use pupil assessment in the course of teacher training (Kusch, 1995). Since I have seven years' experience as a mathematics methods course instructor at the State University that provided the setting this study, my primary concern focuses on the way that assessment bears on the teaching of mathematics. More particularly, I have sought to answer three sets of questions.

First, what dimensions of assessment are most salient in the practice of student teachers? At issue here is the possibility that there are distinctive aspects of assessment that are stressed more than others in the practicum classroom. The effort to answer this question is partly taxonomic and partly descriptive. On the one hand, we will need to differentiate between the aspects of assessment that can reasonably be expected in the practice of teaching. On the other hand, we will need to see whether observations of student teachers suggest patterns in the particular dimensions of assessment that student teachers emphasize.

Second, how does assessment enter into the practice of student teachers? In this regard, we would like to trace some of the ways that the influence of a methods course instructor compares with the influence of a cooperating teacher in the practicum classroom. If we are able to distinguish some of the precepts that are taught in a methods course from those that are advanced by a cooperating teacher, we may be able to describe the interplay of methods instruction and practice teaching.

Third, what are the likely consequences of stressing certain dimensions of assessment during the practicum experience? In short, we would like to know whether there are other issues that deserve our attention once we have investigated the interplay of assessment instruction and practice on the part of student teachers.

The simultaneous offering of two mathematics methods courses at the same university made it possible to develop a case study that would answer these questions—at least as they pertain to the students who participated in the study. As in most case studies, this research has attempted to derive summary observations and conclusions that will be useful to a broad audience of researchers and practitioners. However, the generalizability of these observations and conclusions is limited by the small size and short duration of the study.

The purposes of the study were well-served by fundamental differences between the two methods courses that were offered in the spring of 1992. *Methods Course 1*, which I taught, emphasized the importance of teaching pupils to develop their own strategies when solving mathematical problems. Given the variety of student strategies that emerge when this approach to instruction is adopted, course 1 attempted to demonstrate ways that teachers can integrate assessment into everyday instructional practice, and the consequent need to employ a wide variety of assessment methods. *Methods Course 2*, which was taught by a colleague, emphasized the importance of teaching pupils to understand and follow analytical sequences or algorithms that are appropriate for identifiable mathematical problems. Given the effort to match problems with their algorithmic solutions, course 2 attempted to show how teachers can organize mathematical content so that it can be broken into analytical components that, in turn, can be assessed separately by objective assessment methods. Although the approaches to problem solving emphasized in each methods course are not mutually exclusive, it was expected that the emphasis of each course would be evident in the written documents that were used to guide instruction in each course, and in the practice of student teachers when they first ventured into the practicum classroom.

Heterogeneity among the methods course treatments of assessment practice increases the likelihood that we can answer the first two questions that were enumerated in preceding paragraphs. Thus, a range in recommended assessment practice increases our confidence in the representativeness of observed behavior among student teachers; additionally, contrasts between the practices that are recommended in methods courses help us to trace the relative effects of methods instruction and cooperating teacher influence.

Student teachers at the State University took seven methods courses during their period of classroom instruction. In addition to mathematics, the content areas treated by the required methods courses covered language arts, reading, science, social studies, music, and art. With the exception of the mathematics methods course 1 that is described throughout this essay, the other six methods courses that each student teacher took were essentially comparable in approach to the mathematics methods course 2 that is described in the essay. Given the preponderance of methods instruction that employed the approach of course 2, we would expect the following:

- all course 2 students would adopt course 2 methods when they began their practice teaching;
- some or all course 1 students would adopt course 2 methods when they began their practice teaching; and
- the occasions on which course 1 or 2 students employed course 1 methods may provide evidence that they were influenced by exposure to the approach of course 1.

Since we would like to know if the methods course really makes a difference in the practice of new teachers, we are most interested in the third possibility (analogous to a "treatment effect" in methods instruction) outlined immediately above. Depending upon the circumstances observed in the practicum classroom, the use of course 1 methods may provide useful insights into the ways that a single methods course can make a difference in the practice of new teachers.

Four students from each methods course served as the subjects of the semester-long case study. When reporting on observations, it has been useful to refer to students from course 1 by their coding names, selected so that they would range from A to D: Anne, Beth, Carol, and Donna. Similarly, students from course 2 are referred to by names that range from J to M: Janet, Kelly, Linda, and Mary. This approach to coding helps to distinguish student teachers according to the training that they received in methods courses.

Several different kinds of qualitative data were developed in the course of the study to contrast the training and practice of student teachers. The formal methodological training of student teachers was revealed in the *methods course syllabus* that methods course teachers produced for courses 1 and 2 (Methods course syllabi are presented in Appendix 1). The syllabi offered concrete evidence of the pedagogical objectives deemed most important by methods course instructors. Since the syllabi and statements of objectives that they contained were suitable for textual analysis, I conducted a formal analysis of the texts and statements of objectives in preparation for the study that underlies this report. In addition to documentary evidence of methods course training, *documents and observations from the practicum classroom* were available for coding and secondary analysis [1]. These materials included the following: classroom

observations of the student teachers when they were engaged in teaching; lesson plans that the student teachers submitted to their cooperating teachers prior to the presentation of particular lessons; interviews, both before and after particular lessons, that I conducted with the student teachers; written self-evaluations that student teachers submitted to me in the course of their practicum experience; and formal evaluations of the student teachers that the cooperating teachers also submitted to me at the conclusion of the practicum experience.

The Dimensions and Practice of Assessment

Since the literature on assessment is notably imprecise in its treatment of ways that teachers learn to assess, it has been useful to develop a taxonomy that distinguishes the aspects of assessment that might be observed in teaching practice. Actually, it is most helpful to think of assessment in terms of "dimensions" that can be evident in practice, because this characterization reminds us that we are dealing with a complex phenomenon that can combine several characteristics at any given time. A taxonomy provides the researcher with both a vocabulary and set of analytical categories that aid in the systematic investigation of assessment.

At this point, it is important to emphasize that the dimensions of assessment presented here do not constitute an exhaustive enumeration of ways that assessment can be used. However, the eleven dimensions of assessment which potentially bear on schooling certainly make it possible to differentiate the thinking and behavior of student teachers when they begin their actual practice in the practicum classroom. When this study was undertaken, it was expected that an individual student teacher would employ some of the dimensions of assessment, and that no individual teacher's practice would embrace all of the dimensions that have been identified to date.

The eight student teachers who were studied during this project faced very different demands and expectations in the practicum classrooms that gave them their first opportunity to teach. It is appropriate, then, that there were very complex relationships between the dimensions of assessment that they used in their initial practice.

Assessing Pupil Understanding, Thinking, and Achievement

Assessment enters into teaching practice when teachers gather information about the understanding, thinking, and achievement of their pupils when they work with specific course content. Teachers compare pupils to each other and—usually—to an external set of achievement standards in order to ascertain and demonstrate how well pupils have learned the content of their classwork. Demonstration of assessment rests on a formal logic which avoids ambiguity by the internal consistency of its symbol system (House, 1980:73). Thus, the "fair" use of letter grades by teachers displaces unpleasant subjective judgements that teachers must make about individual students. When teachers assess achievement they do so in ways that are similar to those factors considered in awarding grades for effort. A standard means of assigning a letter grade to the academic activity of a pupil entails the teacher's judgement of the pupil's scholarship, initiative, attitude, cooperation, and individual improvement (Hanson, 1993:216–221; Kandel, 1936; Terman, 1917; and others). These standards are considered subjectively and are weighted by social, cultural, and ecological constraints that are felt by the teacher. This dimension of assessment is often used to compare instruction and certain learning traits and activities among pupils in one course of study with similar traits or activities in another course of study.

Student teachers who came out of course 1 typically assessed pupil performance *during* the lesson, sometimes asking pupils to participate in their own assessment and frequently assessing the discussion and participation of pupils in lesson activities. However, cooperating teachers invariably expressed their concern that self assessment by pupils might cause disorder and give pupils too much freedom.

> Beth, from course 1, devised a lesson on estimation that involved group activity. Pupils would estimate how high they could jump from a standing position; then, they would compare their estimates with their actual jumps; finally, they would determine an average of their estimates and measured jumps. In her lesson plan, Beth stated her intention that the activity should "allow [pupils] to

> understand estimation in a holistic sense." Beth also recorded her expectation that pupil involvement in the lesson would give them a stake in its success, and that the holistic approach to the topic would better prepare them work with mathematical averages. Although her cooperating teacher approved the lesson, he questioned the wisdom of having pupils grade themselves. This reaction prompted Beth to recall, during a subsequent interview: "I knew that I had to show my teacher a set of grades for the activity, so I ended up grading them on whether they completed the measuring on paper. ... It just doesn't seem right to judge what they do on the basis of right and wrong answers. I mean, how does that help you connect with what they're thinking?"

For Beth, the most important aspect of assessing pupil achievement was that she connect their achievements with their thinking. She did not conceive of assessment as the object of her instruction. Beth intended that the pupils' self assessment illuminate their thinking about estimation, and not be an end in itself. As a consequence, when her cooperating teacher declared his expectation that she develop a set of grades from the lesson, she was diverted in part from the primary purpose of her teaching.

In contrast, student teachers who used a course 2 approach dealt with assessment as a separate procedure that they carried out *after* they taught their lesson, when they could focus on the written work of their pupils. The influence of cooperating teachers upon this group of student teachers came into play when the cooperating teachers required that lessons be designed around input, guided practice, checks for understanding of textbook content, and quantifiable measures of pupil performance—typically provided in textbook and worksheet answer keys.

> Janet, from course 2, used the language of the Madeline Hunter Instructional Improvement Program to outline her approach to assessment: "For *input* into the lesson, overheads of pages 294 & 295 from the text are used; for *guidedpractice*, ... solve only problems from page 294, and page 295 ... We will *check* ... *understanding* on only those problems that are shown on the overhead that I prepared. This material will be on Friday's test!" Janet's lesson not only shows the effort to separate assessment from instruction, but it shows the point at which her approach failed her, since her assessment could only concern a manageable group of problems that could be covered and assessed in a thirty-five minute lesson. At a later point in her lesson, her determination to prepare students for the announced test actually interfered with instruction. She had posed the problem of adding (1/2 + 1/2); a student said, "I know, the answer is 2/4," but Janet replied, "No, you must first find a common denominator; try to think of the answer as 1, not as 2/4." Here, Janet revealed her preoccupation with correct answers, instead of the reasons for finding a common denominator. The pupil's suggested answer added both the numerator and denominator; but instead of discussing the error or method that the pupil had employed, Janet directed the pupil to think about what the correct answer should be. Janet's focus was on the right answer, rather than on the method of developing an answer.

Cooperating teachers generally guided student teachers toward instruction that stresses mastery learning. Consequently, student teachers focused on the number of problems assigned to pupils, and the number of problems that pupils are able to complete correctly. Janet's cooperating teacher typically quizzed the class twice a week, and approved of the way that Janet sought pupil input. Since Janet was expected to cover enough content to prepare pupils for an upcoming quiz, there was little class time available for the discussion of solution objectives and methods.

The clearly expressed expectation in practicum classes was that student teachers would take lessons to a point at which grades could be assigned to pupils. Content and instruction faded into

secondary importance. For Beth, assessment limited the emphasis that she could place on exploring and thinking about mathematical content; for Janet, checks for understanding required that she gather information that could be checked uniformly and quickly.

Assessing Pupil Effort

Assessment also enters into teaching practice when teachers gather information about the relative intensity of pupil efforts to learn course content. We can gauge this level of intensity according to several factors, including the amount of time that pupils take to work on the content under study, the number and types of questions that pupils ask about content, and the types of social and physical activity that pupils exhibit as they attempt to work on content. In the main, these kinds of assessment are relatively free of the impact or imprint of people who are external to the classroom. When teachers assess pupil effort, they do so in light of their own attitudes towards pupils, their expectations and observations concerning pupil work and social activity, and the normative expectations that predominate among their colleagues. Teachers often consider factors that are highly subjective in their determination of a grade for effort (Jackson, 1968; Goodman, 1985; Bullough, 1989; McNeill, 1983). Thus when teachers consider student effort in the course of assessment, they may describe and interpret student activity in a local context—enabling them to assess unanticipated features of the educational experience.

The group of student teachers observed in the course of this study were not explicitly required to characterize the effort of their pupils. Although it is important for a teacher to be cognizant of pupil effort when groups are formed and lessons are planned, teachers provide clear evidence that such an assessment has taken place when they comment on (or modify slightly) a grade that they have assigned to individual pupils. As an element in the assessment practice of the eight student teachers, evaluations of pupil effort were conspicuously absent. One explanation for this gap in assessment practice derives from the relatively minor role that the student teachers played in assigning final grades to pupils in the practicum classroom.

Labeling Individual Pupils

Assessment enters teaching practice when it is deemed necessary to develop a summary statement of a pupil's performance. We can think of this summary as typically expressed in the form of a letter grade. Although this grade is sometimes accompanied by a teacher's (written) commentary, it is the reduction of a pupil's experience to a single measure, or to a small number of measures, that for the public may constitute the most conspicuous dimension of pupil assessment (Bishop, 1993). When teachers label pupils by assessment, they sort pupils into pre-existing social and educational identities which correspond with letter grades or group labels (Apple, 1979:126). Perhaps the most common strategy that teachers use for assigning grades is to assess pupil work on content that is fragmented and to derive a comprehensive letter grade subjectively—on the basis of how well students do on skills that teachers assign the greatest worth (McNeil, 1983:123). However, even though teachers may account for the wealth and diversity of their students, they accede to school, district, state, community, and even parental demands for summary labels and assessments. Indeed, in many cases, teachers use the grades to match instructional objectives with educational outcomes, and the class "curve" is factored into appraisals of the efficacy of lesson planning (Goodman, 1985; and Bullough, 1989).

Student teachers from methods course 1 asked pupils to explore their own thinking about the content that they were taught and to write down their ideas about how they personally thought they should be graded. Since pupils were accustomed to being graded by their teachers, the student teachers from methods course 1 had to persuade their pupils to participate in the process of grading themselves. Even more problematic for the student teachers, however, was the set of expectations and practices that cooperating teachers pressed upon them.

> In an interview with Carol about a class on English composition that she had taught and graded, she stated her ambiguous position clearly. "I had a notebook of what I wanted to do in my field experience classroom. I was able to follow it much of the time until she asked me to grade papers. I went in thinking that I (we) should grade language holistically, and in terms of how a

> child's work on a lesson fit in with all of the other work that they had done. My cooperating teacher explained that she graded the class according to the answer keys in the textbook. That gave her 'hard information' to support the grades that she gave on report cards. After she told me how she graded, I was unsure of the ideas that I felt were right. You know, I thought that grades on one part of the lesson should somehow be part of the big picture."

Even when course 1 student teachers were able to define their grading objectives clearly, the student teachers still faced the significant difficulty of integrating their approaches to developing summary statements of pupil performance that fit the pre-existing grading schemes of their cooperating teachers.

Most student teachers from methods course 2 uncritically implemented the admonition from cooperating teachers that they follow established grading policy. Thus, the student teachers bluntly asked pupils for "right answers" and "appropriate ways" of displaying test or quiz results. As revealed in interviews and observations, these student teachers expected that their pupils would understand and accept the assessment methods that cooperating teachers had established.

> Mary emphasized conformity to existing grading schemes—to the extent of weighting the format of an answer more heavily than the analysis that produced the answer. During an interview, Mary recalled how her cooperating teacher clued her into the labels that would govern individual pupils. "The first day I arrived, the kids were taking an aptitude test. My cooperating teacher told me it was important for their future placement. ... First, he said that I should check some papers to get a feel for the kids' abilities. I got the impression that I should not do things much different than he did."

One student teacher from methods course 2 made a consistent effort to employ the holistic approaches to assessment that had been advocated in methods course 1. In this regard, her effort grew out of a personal desire to develop the capacity of pupils to participate actively in their own instruction and learning. However, when faced with her cooperating teacher's expectation that she produce summary statements of pupil performance, she abandoned her attempt to encourage student participation in grading.

> The essence of Kelly's instructions to her pupils is contained in the following sequence of statements that she addressed to her class: "What's important is the way you think of the cartoon strip you created ... If you wish, write me a note about what it is you are saying ... Remember to take the time to color and use dialogue ... When you finish, turn them in. I'll comment on them and return them to you so you can grade your own and each other's. Then I'll collect them again and grade each. All papers get a final grade which I will assign." Ultimately, the open question of whose criteria should be used to assess pupils' work confused the pupils *and* Kelly, and left her with the unwelcome task of neglecting large amounts of pupil work so that she could concentrate on the labeling of a mere fraction of that work.

For most students who had trained in methods course 2 established procedures for labeling individual pupils resonated with their impulse to follow recipes—derived either from the Bloom "objectives" or from the Hunter "program." Mary's case was typical, inasmuch as she acknowledged the link between her methods course instruction and her approach in the practicum classroom: she merely sought to find the correct behavior to plug into the assessment situations that she faced. While atypical, Kelly's approach underscored the power that established expectations have upon the process of attaching assessment labels to pupil work and to the pupils themselves: established procedures would determine the work that was deemed acceptable, and the pupils who were deemed ready to move ahead in the course material.

No other dimension of assessment distorted the efforts of student teachers as much as the ultimate need—perceived by student teachers and their cooperating teachers alike—to label pupils

according to assessments of their work. Lessons were to prepare for homework assignments that could be graded; homework assignments, in turn, were to prepare for quizzes that could be graded; quizzes were to prepare for section and term tests that could be graded; and so on. The cumulative process provided a purpose that justified its very content: classroom work was geared by both student teachers and cooperating teachers to the production of graded and labeled pupils.

Sorting Groups of Pupils

Assessment lies at the heart of efforts to characterize the educational achievements, capacities, and efforts of whole groups of pupils. Within any given school building, this kind of assessment creates groups that can be "tracked" over the course of pupils' educational careers in the school; and within any given classroom, this kind of assessment creates groups which are differentiated by their "skill levels" for instruction on particular topics (Oakes, 1986:43). The techniques that are used to make these distinctions include administered tests of reading achievement, standardized achievement tests, and subjective judgements by classroom teachers (Hanson, 1993:216). In her survey of twenty-five schools that track, Oakes found that tracking was a topic that school personnel were reluctant to discuss openly, either among themselves or with researchers; and this reluctance led to a general sense of confusion about how tracking actually operated. Skill grouping at the classroom level raises similar concerns with respect to assessment. Significantly, skill levels are typically listed on the permanent records of students, and bear on placement in subsequent levels, and upon various social and academic opportunities that may become available by virtue of skills that teachers identify.

Student teachers who came out of courses 1 and 2 tended to embrace the existing groupings and implicit assessments of group members that had been established by their cooperating teachers.

> Linda's enthusiastic endorsement of existing groupings was both uncritical and typical. In an interview, she outlined the classroom regime as follows. "My cooperating teacher was great! In my first days in the classroom she let me work with the 'high' group. I led a discussion and checked a set of their homework papers—all multiple choice—so checking was a routine matter. Ms. Smith showed me her planning book and asked me how we had learned to write objectives in methods. ... I has to show her my objectives each time I wrote them. That was a difficult part of writing them, because there were three different ability groups in my math class, and I had to think about the objectives in three senses. Three sets of grades too!"

The seductive aspect of existing classroom organization lies in its quality of being previously established. Student teachers took existing groupings as received; consequently, their instruction and assessment were geared to arrangements of pupils and content that reinforced the assessments that had preceded their arrival in a given classroom.

Record Keeping

When teachers individualize instruction, they produce conditions that necessitate continual testing and record keeping to discover and monitor pupil needs. Once teachers set criterion-referenced objectives and identify specific criteria for instruction, they frequently devise compatible procedures for record keeping. These procedures are amenable to the creation of quantifiable information that teachers draw from the experience of pupils. In this undertaking, the recording of pupil assessments helps to inform teachers and pupils of ways that they might move through the curriculum and take part in the routine affairs of the school day (Popkewitz, Tabachnick, & Wehlage, 1982). In developing a viable procedure for record keeping, teachers may rely solely upon standardized testing formats or they may rely upon their own judgements for processing information about pupils. On the one hand, standardized testing provides a way for teachers to be accountable for what children learn in general, and more specifically to identify deficiencies in the cases of individual children. On the other hand, teachers may find that the parameters in standardized formats fail to describe instruction in their classrooms accurately, and consequently teachers may follow procedures that rely on their own intuition and feeling for pupils. In either

event, the need for teachers to maintain records has a direct bearing upon the ways that they gather information for grading. Teachers may first judge whether content that they teach is measurable, before they proceed to teach the material. If content is complex or theoretical, teachers may fragment the content so that students can work with it and teachers can measure and grade it more readily.

The durability of pre-existing arrangements noted in the discussion on sorting groups of pupils had an analogue in the record keeping that was observed during this study of eight student teachers. All eight were constrained by the record keeping schema that had been established by their cooperating teachers.

> Anne was typical in her approach to the record keeping aspect of assessment. During an interview she explained how she approached the issue. "[My cooperating teacher] showed me on the first day that she used a specific routine to get the class into the lesson of the day. The procedure roughly followed a pattern of mental math exercises. If the class got about 70% or more correct on these problems, we went on to the practice sheets or the textbook materials. My cooperating teacher told me that grading needed to be done efficiently and speedily, and that I should use the Hunter format just as she did. The kids seemed to be ready for their mental math problems; so I just went right along with her routine."

Cooperating teachers regarded the record keeping aspect of assessment as an immutable practice, and they urged their student teachers to employ pre-existing assessment practices. Teachers took the Hunter format and textbook assessments for granted, since both were widely used in the school and since the resulting records were immediately intelligible when it was necessary to pass pupils between group levels and grades.

Appraising the Efficacy of Lesson Planning

A closely related, but analytically distinct dimension of assessment enters into the consideration of effectiveness in lesson planning. Teachers learn how to plan lessons during methods courses; and when student teachers attempt to implement the abstractions that they have learned during their training, they have still another opportunity to evaluate their own performance. By considering pupil performance, the student teacher develops a point of view about "how well" a lesson that she personally created actually "went." For example, students might plan to teach a skill that involves a set number of problems; and if they cover all of intended problems that they treat in the lesson plan, then they might conclude that the lesson went well. Accordingly, if the method or means of instruction is found wanting, then the teacher will decide that some modification is necessary. Scriven (1974) refers to this process as formative assessment, while Eisner (1985) refers to it as curriculum revision. The criteria that student teachers apply in making this assessment are varied. For example, in one methods class, problem solving may be addressed algorithmically; whereas in another methods class, the essence of problem solving may lie in the heuristics that are used to solve the problem. Certain methods courses require the use of pre-packaged lesson planning "recipes." In other methods courses, the emphasis in lesson planning is on the development by the teacher of a series of statements that identify what new knowledge the lesson will bring to pupils, the academic or social consequences of the lesson, the manner in which the lesson fits into the curriculum, and the manner in which the lesson adds to the learning of pupils.

The student teachers from methods course 1 were taught to consider assessment as an act that is embedded within other lessons that precede and follow an individual lesson. Moreover, course 1 teachers were encouraged to rely upon their own understanding of assessment as it pertains to the lessons that they teach, and to examine the consequences of their ideas for the teaching and learning of content. When cooperating teachers permitted, course 1 students typically taught cooperative group activities in which they assessed both the academic and social aspects of pupil activity.

> Anne's experience illustrates the delicate balancing that was necessary when course 1 student teachers attempted to employ

> assessment methods that were advocated in that course. "I discussed [with my cooperating teacher] how different children in the class went about thinking in the set of decimal problems that they did—why decimal points should be lined up, why the decimal point is used period. This [had gotten] them thinking about different ways to do the problems, and I saw different ways to assess them because when I knew why they were answering there was more to go on than just whether they got the right answer."

Anne had hoped that she could explore the underlying thinking of her pupils concerning decimals. Nonetheless, despite the freedom that her cooperative teacher provided for Anne to experiment with her assessment methods, Anne discovered that there was a clear disjunction between the intentions of her lessons and the intentions of prior instruction by the cooperative teacher. Previously, pupils had been taught to find "the right way" to think about topics in mathematics; consequently, it seemed impractical to the pupils to pursue "deeper" thought about the concept at hand—in this case, decimals.

In contrast, methods course 2 student teachers were taught to approach assessment as a formal step to be reproduced in any lesson plan that they wrote or taught. Teachers from this group relied upon pre-existing methods to integrate lessons: Bloom's Taxonomy of Educational Objectives (1955) and Madeline Hunter's Instructional Improvement Program (1988) supplied assessment categories and methods.

> Janet revealed the principal limitation of this approach to assessment in a post-observation interview. "I planned to teach the lesson so that they would understand Greatest Common Factor better. But after we graded papers, I didn't really know if they knew it any better than when the lesson began. There was just a set of scores to go by!"

Although Janet had thought that her statement of objectives would fit her lesson into the larger sequence of lessons on factoring, her discovery that she had less information after assessment than expected was typical of the student teachers who sought to employ planning recipes. The statements of objectives that course 2 students made for their lessons yielded little information that could be used to make informed decisions about assessment. Student teachers from course 1 were left with questions about ways to apply the information that they gathered from assessment, and they struggled to recognize whether their objectives for instruction were satisfied.

In the practicum classroom, student teachers from both course 1 and course 2 discovered that their approaches to assessment did not help them ascertain the efficacy of lesson planning. For course 1 students, like Anne, the problem lay in the disjunction between methods that they sought to employ and the methods that their cooperating teachers had previously adopted; for course 2 students, like Janet, the problem lay in the fundamental unintelligibility of data obtained from standard assessment methods.

Appraising the Efficacy of the Curriculum

When teachers implement novel curricular forms, such as the "new math," they may attempt to assess the efficacy of the new curriculum in ways that are not entirely analogous to the individual teacher's assessments of lesson planning. The new and the old curricula are generally compared over time. In making these kinds of comparisons, several factors may be considered: class preparation time; pupil involvement; implementation time; resource availability and allocations; and community receptiveness. However, it is not only when new curricular forms are introduced that whole curricula are assessed by teachers. When student teachers are first exposed to a particular curriculum during their practice teaching, they may decide how well the curriculum "fits" their personal styles of thinking about the content that they teach, and how well the curriculum can be adapted to the lessons that they have learned in their methods courses. This study examines the latter aspect of curricular assessment, investigating the degree to which student teachers identify practical educational needs in the context of field study that were previously addressed in the work of the methods course.

The curricular dimension of assessment was not addressed by the eight student teachers who participated in this study. This observation is not really surprising, since student teachers might reasonably believe that cooperating teachers and review structures at their host schools were entirely responsible for this kind of assessment. Moreover, the degree of humility that most student teachers acquire while in the practicum classroom would tend to restrain them in the event that they might wish to comment for the record on broad curricular issues.

Plotting and Sequencing Strategies and Topics

Particularly in the context of mathematics instruction, assessment is central to the organization of sequences of instructional strategies and topics. Sequential instruction among topics in mathematics has been emphasized in the work of influential western learning theorists, such as Piaget (1953), Inhelder and Piaget (1969), Ausubel and Fitzgerald (1962), Gagne (1965), and Dienes (1964). These writers start with the insight that learning falls into clear stages, and argue that assessment makes it possible to consider the difficulties that pupils will encounter within these stages. Each theory has advocated that content be covered in a "progression" that starts with relatively simple material and moves toward more complex material. In teaching arithmetic, for example, Dienes argues that children learn concepts in stages, and that teachers are advised to encourage conceptual learning first—with concrete manipulative activities preceding any sort of abstract learning. Significantly, although Piaget and Dienes contend that there are characteristic and identifiable stages at which learning may be assessed as children mature, they caution that the pace of learning may vary among children (see also Hanson, 1993:216–221; Kandel, 1936; Terman, 1917; and others). Notwithstanding the prevailing view that focuses on stages of child development, Vygotsky argues that when a child learns an arithmetical operation, the development of the operation has only begun; the curve of development does not necessarily coincide with the curve of school instruction; and, generally, instruction precedes development (Vygotsky, 1986:179–189). Vygotsky draws attention to "sensitive periods" in instruction when children are most receptive to instruction, and he suggests that teachers plot instruction with regard to different periods at which a child's understanding "ripens." Thus, in Vygotsky's approach, assessment is a matter of identifying periods of potential learning and sequencing instructional activities for the future.

Although interviews with course 1 student teachers revealed that they would have liked to develop their own sequences of topics, their temporary status in the practicum classroom prompted them to conform to the larger scheme that had been determined by the cooperating teacher who had opened the classroom up to them.

> The extent of conformity is revealed by the experience of Anne. One of her lesson plans stated the following. "The lesson begins with 12 'mental math' questions. We'll work on these in the first 10 minutes of class. If they meet criteria on those questions we'll go on to new material. If they do not get at least 70% of the mental math we'll go back and review ... In either case, the main point of the lesson will move to a discussion of 'real life uses of multiplication of decimals,' on which we will spend at least 20 minutes. If they seem to understand today's topic, I'll assign worksheet #3, if not, then the worksheet they did with Ms. F" During her presentation of the lesson, Anne read directly from the script in the teacher's edition of the worksheet. ... She then noted items that seemed difficult for the pupils, and selected those items to use with the Power Builder set of lessons.

Anne planned to cover only as much content as time in the class permitted her to assess. The cooperating teacher had broken the topic under study into as set of time-dependent components that corresponded to her conception of pupil skill development, and the cooperating teacher expected Anne to maintain the time-dependent pattern. As a consequence, Anne write little in her lesson plan that revealed her thinking about the content that she was teaching, but she wrote much about time management. Although there are vestiges of course 1 approaches to assessment in her use of the first ten minutes of the lesson to develop an interactive discussion of mental math Anne

had to abbreviate the interactive treatment of the larger issue to cover the material that her cooperating teacher suggested.

Course 2 student teachers also approached the plotting and sequencing of topics as their cooperating teachers wished, but the student teachers with this training embraced the existing topical sequence more thoroughly than their course 1 counterparts.

> For example, Mary's lesson plan for a biology class framed assessment and lesson planning in the following terms. "The students will use microscopes to examine the slides of each specimen. The use of microscopes will go as follows: first, they will make an observation of the slides—I will note and evaluate their observation; second, they will compare groups of different specimens—I will note and evaluate their comparisons; third, the students will fill in the worksheet that goes with the set of slides." Another course 2 student teacher, Linda, was even more sensitive to her cooperative teacher's approach and classroom organization. During a post-observation meeting she summarized her intentions. "First, I went over what fractions are. Then, I asked them to state a good definition. Next, we did the simple stuff, like setting up problems. They'd been working on this material with Ms. T for weeks. The high group responded in the same way as the low kids—they asked ... if this material would be on the test."

The striking characteristics of Mary and Linda's approaches to assessment in these examples lie in their acceptance of time categories to frame assessment in their lesson plans and instructional practices, and in their reliance on fragmented approaches to instruction.

Observations and interviews clearly show that the pre-existing temporal order of practicum lessons impressed student teachers from both methods courses, and compelled them to modify their planning so that they could conform to the established lesson and assessment sequence. The established order told student teachers what content was to be assessed, and when; it represented the manner in which the cooperating teacher conceptualized assessment in time; and it directed student teachers to employ assessment in relation to regularly spaced intervals.

Sanctioning Pupil Thinking

Teachers use assessment to sanction the thinking of their pupils, by serving as gatekeepers or guardians over the topics that are chosen and the pupils who will be exposed to particular content. In brief, teachers decide the knowledge that is "appropriate" for certain pupils. Across whole classes, this sanctioning can involve decisions about the segmentation of lessons, and the requirement that the class master fragments of content before they are permitted to move on to new content. Within classes, sanctioning can involve the division of classes into groups according to the attributed "abilities" of their members, and the allocation of content to each ability grouping. For both whole classes and the groups within classes, teachers use assessment to decide and communicate messages that define student success and failure, and subsequent allocations of classroom resources and attention. Textbook topics and materials are allocated to pupils by virtue of judgments that teachers make about their thinking. Thus, teachers may use assessment to control the access pupils have to certain topics, resources, and peers. Teachers may delay or even refuse to begin to teach "new" material until previous homework is checked. More dramatically, teachers may also assess "mastery learning" to regulate pupil transitions through a course of study, and may keep pupils "occupied" with a single topic until they have demonstrated that they have mastered the topic by passing an achievement test (Goodman, 1985).

Student teachers from methods course 1 had been trained in that course—by direct instruction and example—to identify and build upon the distinct intellectual accomplishments of individual pupils. In the course of assessment, the application of this principle requires that teachers recognize that pupils may differ in the ways that they approach and solve any given problem. However, when student teachers from methods course 1 entered the practicum classroom, their cooperating teachers required that they fragment course content into installments—to make pupil work readily assessable by making it comparable. Thus, where methods course 1 had emphasized the uniqueness of pupil accomplishment, the practicum classroom emphasized the

commonalities that were expected among accomplished pupils. The discontinuity between the method used to assess pupil thinking in the methods course and the method used to accomplish this end in the practicum classroom was invariably resolved in favor of the approach already established by the cooperating teacher.

> Classroom observations of Donna reveal the plight of course 1 teachers who were unable to integrate their hope to individualize assessment with their understanding of how a "conventional" classroom is run. During one lesson on the addition of integers, she began with a quiz that consisted of five addition problems. "You have about 7 minutes to complete the quiz. After you finish doing the quiz raise your hands. We will check them together; and if most of you have at least three correct we will go on. ... When this is done, go on to page 79 in the text." After some time had elapsed, she asked, "Who needs help ...? Let's close our books and check that procedure for adding integers between –10 and –20."

By segmenting content into measurable installments that served as qualifying activities for the lessons that would follow, Donna constructed her pupils' knowledge of integers and simultaneously constructed moments of assessment. In so doing, she informed her pupils that she expected certain kinds of accomplishment at each stage of the instructional and assessment sequence, thereby sanctioning the kinds of pupil thought that conformed with teacher expectations for the lesson at hand.

Student teachers who had trained in methods course 2 did not have to deal with a discontinuity between their preparation and the expectations of cooperating teachers. Methods course 2 had emphasized the need to develop measurable objectives that could be assessed at stages in the instructional plan. Since the course 2 approach to lesson planning was directly comparable to the approach advanced in each of the other content area methods courses taken by student teachers, there were course 1 students who adopted the prevailing approach with a clear understanding of their objectives and instructional responsibilities.

> Carol's lesson plan was terse and clear on the decisions that she would make regarding pupil knowledge. "The lesson is the 27th in a series. We will start with 12 oral practice problems that lead into Worksheet #27. If they do alright on the oral practice set, I'll assign the worksheet. After WS #27, they will need to pick up speed with the new strategies to be ready for the 'time test'."

Reduced to a sequence of separable elements, this approach to the sanctioning of pupil thought made for formulaic thought on the part of the student teacher. Each fragment of the lesson was to serve as an intellectual check-point on the way to a more comprehensive test that could be administered once all of the check-points had been passed.

Policing Pupil Behavior

The use of assessment to police pupil behavior is closely related to its use for sanctioning pupil thinking. On the one hand, the sanctioning of thinking is intended to govern cognitive and "educational" objectives; on the other hand, the policing of behavior is intended to regulate the physical activity that takes place in a classroom. The contrasts—and the linkages—between cognitive and physical considerations are illustrated by the kinds of decisions that teachers make when manipulatives and group work might be used. The decision that pupils are ready to move on to a segment on measurement in mathematics would grow out of assessments of pupil thinking; however, the decision to permit pupils to work with such manipulatives as compasses or rulers, or work productively in interactive groups, would grow out of assessments of pupil behavior. Pupils who do not meet teacher criteria for acceptable classroom behavior are consequently treated differently from pupils who satisfy the behavioral criteria of their teachers.

Student teachers from each methods class were indistinguishable in their use of assessment to police pupil behavior. The subtle transition from behavioral objectives that were "cognitive" to behavioral objectives that were merely "physical" was generally apparent to the student teachers,

but they seemed unable to prevent the transition from taking place when faced with the practical problems of controlling a classroom.

> Mary planned a lesson to assess her pupils' achievement by using a quiz. Her lesson plan envisioned the review of textbook material. "The students will view two examples of organic notes on the board. They will decipher them, understand them, and they will gain their interest in sharing the notes." In the excerpt from her plan, she stated her cognitive objective—that pupils would view, decipher, and understand organic notes. However, during the actual teaching of the lesson, Mary noted with chagrin that it was difficult to interest pupils in the topic and difficult to induce them to share their observations. Since she was unable to ascertain whether her pupils had achieved the cognitive objective that she had established, Mary shifted her assessment focus to that of managing physical behavior. Mary repeatedly reminded her pupils to quiet down and get busy. In the post-observation interview she said that "I found myself concentrating on just trying to get them to listen and to stay on task. The pupils in the different skills groups demonstrated different types of misbehaviors. Pupils in each group challenged doing the worksheets with different types of mischief; and I found that managing behavior was a difficult matter."

External Accounting

Assessment is central to the kinds of reporting that teachers and schools are required to make to educational and governmental agencies, and to the public. Parlett and Hamilton write that such accounting may constitute or define an instructional system (or, by extrapolation, a teacher's role in that system) which includes a set of pedagogic assumptions and details of implementation techniques (Parlett and Hamilton 1976:144). "Teaching to the test" is the common response of teachers who feel that they must "get the pupils through the material." Consequently, "instruction" and "learning" become synonymous with successful test scores (Goodman, 1985). The relation between instruction and assessment for external purposes often prompts teachers to use drill-and-practice methods of instruction, in place of more interactive approaches to teaching, since it is expected that the former methods will raise pupil scores on standardized tests. In working toward an eventual external accounting, teachers often defer to expert forms of knowledge when they choose an approach to lesson planning and implementation. One widely used model is the Madeline Hunter School Improvement Process (Gentile, 1988) that encourages teachers to define their responsibilities in terms of preparing, arranging, and grading textbook or worksheet assignments according to standardized answer keys.

As in so many of the observations undertaken for this study, student teachers from both courses 1 and 2 demonstrated very similar approaches to the external accounting dimension of assessment. The case of Anne is particularly instructive because she had been an enthusiastic participant in course 1; but once in the practicum classroom she found it expedient to take up her cooperating teacher's approach to assessment.

> The sequence of change in Anne's evolution is revealing—because it is so inexorable.
>
> She began by acting on the cooperating teacher's request that she use the same pre-packaged materials as the cooperating teacher used. The plan included a set of headings provided by the textbook publisher: unit title, behavioral objective, resources, worksheets, handouts, text pages, warm-up, background, vocabulary, evaluation, pertinent NCTM standards, and implications for future lessons.
>
> Anne used the materials in an awkward manner, by telling her pupils that the day's work would help them on the next test.